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# MASS TREATMENT FOR INTESTINAL HELMINTHIASIS CONTROL IN AN AMAZONIAN ENDEMIC AREA IN BRAZIL

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## SUMMARY

The objective of the present study was to estimate the prevalence of soil-transmitted helminthiasis and evaluate the sanitary conditions and the role of a mass treatment campaign for control of these infections in Santa Isabel do Rio Negro. A cross-sectional survey was carried out in 2002, to obtain data related to the sanitary conditions of the population and fecal samples for parasitological examination in 308 individuals, followed by a mass treatment with albendazole or mebendazole with coverage of 83% of the city population in 2003. A new survey was carried out in 2004, involving 214 individuals, for comparison of the prevalences of intestinal parasitosis before and after the mass treatment. The prevalences of ascariasis, trichuriasis and hookworm infection were 48%; 27% and 21% respectively in 2002. There was a significant decrease for the frequency of infections by *Ascaris lumbricoides* ($p < 0.05$; OR / 95% CI = 0.44 / 0.30 - 0.65), *Trichuris trichiura* ($p < 0.05$; OR / 95% CI = 0.37 / 0.22 - 0.62), hookworm ($p < 0.05$; OR / 95% CI = 0.03 / 0.01 - 0.15) and helminth poliparasitism ($p < 0.05$; OR / 95% CI = 0.16 / 0.08 - 0.32). It was also noticed a decrease of prevalence of infection by *Entamoeba histolytica / dispar* ($p < 0.05$; OR / 95% CI = 0.30 / 0.19 - 0.49) and non-pathogenic amoebas. It was inferred that a mass treatment can contribute to the control of soil-transmitted helminthiasis as a practicable short-dated measure. However, governmental plans for public health, education and urban infrastructure are essential for the sustained reduction of prevalences of those infections.

**KEYWORDS:** Intestinal helminthiasis; Mass Treatment; Control; Amazon.

## INTRODUCTION

Intestinal parasitosis lie among the many health problems observed in economically disadvantaged populations of developing countries.

Those infections reveal clear social and economical determinants, with high prevalences in regions with deficiency in sanitation, potable water supplies, education and adequate dwelling conditions[30].

The burden attributed to soil-transmitted helminthiasis has been studied in three domains: growth and ponderous gain deficits, iron deficiency anemia and disturbances of cognitive function[5,30].

The association between malnutrition and intestinal parasitosis has been demonstrated in cross-sectional surveys involving the correlation between anthropometric data and both prevalence and intensity of infections[15,24,26,27,29]. Those conditions cause clear damage to full individual development, affecting even cognitive function and school performance of children[5,25].

Besides those insidious course effects, acute complications occur, often serious and potentially fatal, such as intestinal obstruction, intense anemia and rectal prolapse[8], observed mainly when occurring infections by high parasitic loads, afforded by high levels of exposition observed in absence of adequate conditions of sanitation and dejection destination.

From 2000 on, the World Health Organization (WHO) has been working up control strategies against soil-transmitted helminthiasis, intensely based on mass administration of anti-helmintics[36,37].

Those strategies are based mainly on safety and costs of the drugs used, supervising systems, maintenance of actions and community participation[14,21,22,32].

Mass administration of anti-helmintics is considered strategic and particularly effective in the control of hookworm infection and ascaridiasis[4,10]. In areas of high prevalence of infection by *Trichuris trichiura* the benefits would be focused on reduction of prevalence and decreasing of parasitical burden, with preventions of severe forms[10].

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Mass administration of anti-helmintics has been performed in some countries and has used benzimidazole derivatives as choice drugs, including albendazole and mebendazole[11,23,31,38]. These drugs act through inhibition of tubulin-polimerase, impeding the formation of microtubules and cellular division[19], admitting its administration to one year older children[21,22]. Experimental studies involving the administration of mebendazole and albendazole to rats and rabbits showed teratogenic potential for both drugs only in high doses[33,35]. The risk of occurrence of congenital abnormalities associated to the administration of benzimidazolics during pregnancy was analyzed by BRADLEY & HORTON[2] and DE SILVA *et al.*[9]. Those authors suggested that the treatment must be avoided during the first trimester of pregnancy.

Except for the special program for schistosomiasis control, which had as main axis the administration of oxamniquine and praziquantel in endemic areas, in 70´s years[6,18] there is no accumulated experience in mass treatments with anti-helmintics in Brazil.

The objective of this survey was, in the first stage (2002), to characterize medical and sanitary conditions of the studied area, and estimate the prevalence of intestinal parasitosis. In a second stage it was aimed carry out a mass treatment campaign for the main intestinal helminthiasis, and to evaluate its possible effect on prevalence, comparing two coproparasitologic surveys performed in 2002 and 2004.

## METHODS

**Studied area and population:** The municipality of Santa Isabel do Rio Negro is situated in the northwest of Amazonas State (0º 28' S and 65º 32' W), being distant 781 km from Manaus, capital of the State, through the Negro river. Localized in the region of Alto Rio Negro, it occupies an area of 62,846 km$^2$, 90% of which being covered by the Amazonian Rain Forest. The weather is hot and humid, with temperatures between 26 e 32 ºC[16].

The population of 10,561 inhabitants has indigenous ancestry in its majority, being 4,220 of them residents at the municipality's seat and 6,341 distributed in riverine communities over the municipality territory, including part of the Yanomami Indigenous Land[16]. Inhabitants of the municipality seat are descendants from Tukano Oriental (which includes Tukano, Pira-tapuya and Desana groups) and Aruak (Baniwa, Bare and Tariana groups) speaking societies. At present, interethnic marriage is very frequent, being common the existence of individuals with parents belonging to different groups.

The health system is extremely deficient and the municipality does not have regular medical assistence. There is no policy for intestinal parasitosis control in the region.

Negro river has dark and very acid water (with pH about 4), owing to the great amount of organic materials in decomposition produced by the forest what causes problems to the population's potable water supplying system[17]. The supplying of drinking water is promoted by the Sanitation Company of Amazonas State (COSAMA), through direct suction from the Negro river. The suction is made too closely to the margin, in an area attended by laundresses and contaminated by dejections coming from neighborhoods of the municipality's seat, of which margins flood in the high-tide period. The water is conveyed to the population after being roughly treated with sodium hypochlorite, without filtration and decantation stages, maintaining its dark color and acid pH. The dwellers do not ingest this water, owing to its bad taste; smell and final aspect, preferring for consume the water from artesian wells, not close to their residences. Sanitary infrastructure is deficient and there is no system for excreta collection.

This survey involved the urban population of the municipality's seat.

**Collecting and processing of fecal samples and demographic data:** A cross-sectional survey was performed in July 2002, involving collection of fecal samples and obtainment, through a questionnaire, of data related to demographic, socioeconomic and sanitary conditions, in 87 of the 773 domiciles of the municipality's seat. The technique of systematic sampling by conglomerate was employed, being defined the domicile as sample unity. Variables related to the parents, such as literacy rate and income were extrapolated to the whole family in order to compare frequencies of soil-transmitted helminthiasis infection between groups. The domiciles were visited by post graduation students of the Department of Tropical Medicine of the Oswaldo Cruz Foundation, who provided plastic fecal collectors with preservative (10% formaldehyde) for 474 people. Of those, 308 returned the fecal sample. In July 2004, a new survey was performed in the municipality's seat, using the same methodology of sampling and collecting of fecal samples. The fecal samples were returned by 214 individuals in this survey. The samples in 2002 and 2004 were examined at the locality, by the same parasitologists in both years, through the technique of Coprotest®, a commercial kit, modified from Ritchie method[39] and no additional quality control measures were taken.

**The mass treatment:** In July 2003 was performed in the city a mass treatment for intestinal helminthiasis. Physicians of the Oswaldo Cruz Foundation visited, during two weeks, every occupied domicile of the city, administrating under supervision, one 400 mg single dose of albendazole for every individual with more than 24 months of age and prescribing a treatment with mebendazole for children aged between 12 and 24 months, with two daily doses of 100 mg administered during three days. Pregnant women and those with amenorrhea were excluded of the survey.

We administered 3,381 single doses of albendazole and 118 treatments with mebendazole, reaching coverage of about 83% of the population.

**Analisys methods:** Data were analyzed through descriptive statistics of the sample as a whole and stratified by age. Comparison of frequencies of categorical variables was performed through bivariate analysis by the chi-square test, considering statistical significance at the level of 5%. Data were analyzed and stored on EpiInfo version 3.2.2.

**ETHICS:** Every family involved in the survey was included after the responsible having signed an informed consent form, being the protocol of research approved by the Oswaldo Cruz Foundation Committee for Ethics on Research.

## RESULTS

The 2002 survey showed that the majority of adult population (56%, 79/141) has four or less education years, with an illiteracy rate of 17%. It was observed that 26% (23/87) of the dwellings had no latrines, 30% (26/87) had rude outdoor ones, with no feaces tanks; and 66% (57/87) had potable water supply (canalized or supplied by wells). Monthly income of 68% (96/141) of surveyed adults is until two minimum wages (Table 1).

Table 2 shows that families with no cash-oriented activities presented a higher frequency of *A. lumbricoides* infection (57%) than those with a monthly income of at least three minimum wages (30%, $p < 0.05$). Also, ascariasis and hookworm infection were more frequent in people living in dwellings without latrines (59% and 30% respectively, $p < 0.05$ for both). Considering any infection by the three major soil-transmitted helminths studied (*A. lumbricoides, T. trichiura* and hookworm), we observed higher frequencies on groups does not possessing latrine or cash-oriented activities (67% and 73%, respectively) when compared to groups with indoor latrines or monthly income up to three minimum wages (49% and 60% respectively, $p < 0.05$ for both).

**Table 1**
Socioeconomic and educational data of 141 adults and characteristics of 87 dwellings surveyed in Santa Isabel do Rio Negro, 2002

| Variable | Frequency | |
|---|---|---|
| **Literacy rate *(education years)*** | *N* | *%* |
| Males n = 53 (38%) | | |
| Illiterate | 9 | 17 |
| 1 to 4 | 23 | 43 |
| ≥ 5 | 21 | 40 |
| Females n = 88 (62%) | | |
| Illiterate | 14 | 16 |
| 1 to 4 | 33 | 37 |
| ≥ 5 | 41 | 47 |
| **Dwelling characteristics** | | |
| *Floor* | | |
| Wood | 7 | 8 |
| Cement | 58 | 67 |
| Ceramic | 12 | 13 |
| Soil | 5 | 6 |
| Other | 5 | 6 |
| *Latrine* | | |
| Inexistent | 23 | 26 |
| Indoor (with rudimentary tank) | 26 | 30 |
| Outdoor (with no tank) | 38 | 44 |
| *Source of drinking water* | | |
| Canalized | 42 | 48 |
| Well | 15 | 18 |
| Rain | 2 | 2 |
| River | 8 | 9 |
| Other | 20 | 23 |
| **Income** | | |
| No cash-oriented activities | 6 | 4 |
| 1 to 2 minimum wages* | 90 | 64 |
| Up to 3 minimum wages* | 45 | 32 |

*1 minimum wage = 150 USD monthly

The comparison of helminths and protozoa prevalences between the years 2002 and 2004 is presented in Tables 3 and 4. We observed statistically significant falls for *Ascaris lumbricoides, Trichuris trichiura,* hookworm*, Entamoeba histolytica/dispar, Entamoeba coli* and *Iodamoeba butschlii.* The cestoid *Hymenolepis nana* was detected in five subjects in 2002 and no cases of this parasite were found in 2004. Frequency of poliparasitism was also reduced as showed on Table 5. The survey carried out in 2002 showed that 26.5% of population was infected with two or more helminths. This frequency was 5.6% in the 2004 survey.

## DISCUSSION

There is little experience in Brazil with the mass administration of anti-helmintics for soil-transmitted helminthiasis control. This kind of intervention has been recommended by WHO, as related in the Experts Committee's Report[37].

Our comparison of intestinal parasitosis prevalences in the years 2002 and 2004 showed significant reduction for *Ascaris lumbricoides, Trichuris trichiura* and hookworms, evidencing also significant reduction of frequencies of infection by *Entamoeba histolytica/dispar* and other amoebas. Though the administration of a single dose of albendazole is not recommended for treatment of amebiasis, GELTMAN *et al.*[12] refer statistically significant decrease of *Entamoeba histolytica/dispar* infection prevalence in African refugees who migrated to the United States after pre-departure administration of a 400 mg single dose of this drug. The authors compared two surveys, performed before and after the implementation of a program of empiric administration of albendazole before the individuals´ departure from their countries of origin[12]. Although we have observed similar results, additional surveys must be performed to evaluate the impact, at public health level, of the treatment with a single dose of albendazole in infections by *Entamoeba histolytica/dispar* and non-pathogenic amoebas.

Although reduction in intensity of infections was not assessed in the present study, it could be assumed that the fall of prevalence of soil-transmitted helminthiasis might have led to an additional reduction of the disease burden associated to these infections[13].

It has been emphasized that school age children have the risk of developing chronic complications associated to intestinal helmintiasis[3,7]. The 1993 World Development Report considered intestinal helminths as a first cause of disease burden in children aged 5 - 14 years[34]. The conditions associated to those infections include growth retardation, reduced physical activity, anemia and impaired educational performance[30]. Girls and women are also considered as vulnerable groups to those complications, mainly related to the development of iron deficiency, having being related that 56% of pregnant women in underdeveloped countries have anemia[1].

High prevalences of intestinal parasitosis at Santa Isabel do Rio Negro observed on 2002´s survey reveal clear socioambiental

**Table 2**
Frequency of soil-transmitted helminthiasis according to some socioeconomic variables in Santa Isabel do Rio Negro, 2002
(*Parental data were extrapolated to the whole family)

| Variable | *Ascaris lumbricoides* | | *Trichuris trichiura* | | Hookworm | | Any helminth parasitism | |
|---|---|---|---|---|---|---|---|---|
| | % | p (chi-square for trend) | % | p (chi-square for trend) | % | p (chi-square for trend) | % | p (chi-square for trend) |
| *Education* (years on school)* | | | | | | | | |
| none n = 41 | 61 | 0.18 | 19 | 0.27 | 29 | 0.09 | 71 | 0.40 |
| One to four n = 118 | 45 | | 22 | | 16 | | 59 | |
| Five or more n = 136 | 46 | | 29 | | 26 | | 64 | |
| *Family income* (minimum wages)* | | | | | | | | |
| No cash-oriented activities n = 21 | 57 | < 0.05 | 19 | 0.32 | 33 | 0.10 | 67 | < 0.05 |
| One to two n = 193 | 55 | | 28 | | 23 | | 69 | |
| Three or more n = 94 | 30 | | 21 | | 15 | | 49 | |
| *Latrine* | | | | | | | | |
| Inexistent n = 92 | 59 | < 0.05 | 30 | 0.72 | 30 | < 0.05 | 73 | < 0.05 |
| Inside the house (with rudimentary tank) n = 75 | 41 | | 24 | | 15 | | 55 | |
| Outside the house (with no tank) n = 131 | 43 | | 26 | | 20 | | 60 | |

**Table 3**
Comparison of soil-transmitted helminth infections frequencies in 2002 and 2004 in Santa Isabel do Rio Negro, Amazonas, Brazil

| *Age group (years)* | 1 to 5 | | | | 6 to 14 | | | | > 14 | | | | Total | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Parasite | 2002 n = 71 | 2004 n = 40 | OR 95%CI | p | 2002 n = 86 | 2004 n = 54 | OR 95%CI | p | 2002 n = 151 | 2004 n = 119 | OR 95%CI | p | 2002 n = 308 | 2004 n = 213 | OR 95%CI | p |
| Any helminth n (%) | 41 (58) | 7 (18) | 0.16 (0.05-0.43) | < 0.05 | 56 (65) | 23 (43) | 0.40 (0.19-0.85) | < 0.05 | 97 (64) | 31 (26) | 0.20 (0.11-0.34) | < 0.05 | 194 (63) | 61 (29) | 0.24 (0.16-0.35) | < 0.05 |
| *Ascaris lumbricoides* n (%) | 34 (48) | 7 (18) | 0.23 (0.08-0.64) | < 0.05 | 44 (51) | 23 (43) | 0.71 (0.34-1.49) | 0.32 | 69 (47) | 31 (26) | 0.42 (0.24-0.73) | < 0.05 | 147 (48) | 61 (29) | 0.44 (0.30-0.65) | < 0.05 |
| *Trichuris trichiura* n (%) | 12 (17) | 4 (10) | 0.55 (0.14-2.02) | 0.32 | 24 (28) | 9 (17) | 0.52 (0.20-1.31) | 0.12 | 43 (28) | 11 (9.2) | 0.26 (0.12-0.56) | < 0.05 | 79 (27) | 24 (11) | 0.37 (0.22-0.62) | < 0.05 |
| Hookworm n (%) | 4 (5) | - | 0.00 (0.00-2.73) | 0.12 | 22 (25) | - | 0.00 (0.00-0.28) | < 0.05 | 40 (26) | 2 (1.7) | 0.05 (0.01-0.21) | < 0.05 | 66 (21) | 2 (0.9) | 0.03 (0.01-0.15) | < 0.05 |

**Table 4**
Comparison of intestinal protozoan infections frequencies in 2002 and 2004 in Santa Isabel do Rio Negro, Amazonas, Brazil

| *Age group (years)* | 1 to 5 | | | | 6 to 14 | | | | > 14 | | | | Total | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Parasite | 2002 n = 71 | 2004 n = 40 | OR 95%CI | p | 2002 n = 86 | 2004 n = 54 | OR 95%CI | p | 2002 n = 151 | 2004 n = 119 | OR 95%CI | p | 2002 n = 308 | 2004 n = 213 | OR 95%CI | p |
| Any protozoan n (%) | 33 (46) | 10 (25) | 0.38 (0.15-0.97) | < 0.05 | 49 (57) | 23 (43) | 0.56 (0.27-1.18) | 0.09 | 104 (69) | 42 (35) | 0.25 (0.14-0.42) | < 0.05 | 189 (61) | 75 (35) | 0.34 (0.23-0.50) | < 0.05 |
| *Entamoeba histolytica/ dispar* n (%) | 12 (17) | 5 (13) | 0.70 (0.20-2.40) | 0.53 | 29 (34) | 6 (11) | 0.25 (0.08-0.69) | < 0.05 | 64 (42) | 18 (15) | 0.11 (0.06-0.22) | < 0.05 | 105 (34) | 29 (14) | 0.30 (0.19-0.49) | < 0.05 |
| *Giardia lamblia* n (%) | 15 (21) | 4 (10) | 0.41 (0.11-1.49) | 0.13 | 7 (8.1) | 3 (5.5) | 0.66 (0.13-3.04) | 0.56 | 5 (3.3) | 6 (5) | 1.55 (0.41-6.03) | 0.47 | 27 (8.8) | 13 (6.1) | 0.68 (0.32-1.40) | 0.26 |
| *Entamoeba coli* n (%) | 13 (18) | 4 (10) | 0.50 (0.12-1.81) | 0.24 | 30 (35) | 11 (20) | 0.48 (0.20-1.13) | 0.06 | 73 (48) | 19 (16) | 0.20 (0.11-0.38) | < 0.05 | 116 (38) | 37 (17) | 0.35 (0.22-0.54) | < 0.05 |
| *Iodamoeba butschlii* n (%) | 9 (13) | - | 0.00 (0.00-0.98) | < 0.05 | 10 (12) | 1 (1.8) | 0.14 (0.01-1.14) | < 0.05 | 39 (26) | 3 (2.5) | 0.07 (0.02-0.26) | < 0.05 | 58 (19) | 4 (1.9) | 0.08 (0.03-0.24) | < 0.05 |

**Table 5**
Comparison of intestinal poliparasitism infections frequencies in 2002 and 2004 in Santa Isabel do Rio Negro, Amazonas, Brazil

| Parasites | 2002 (n = 308) n (%) | 2004 (n = 214) n (%) | p | OR / 95% IC |
|---|---|---|---|---|
| *A. lumbricoides* + *T. trichiura* | 36 (12) | 11 (5.1) | < 0.05 | 0.38 / 0.18 - 0.81 |
| *A. lumbricoides* + hookworm | 22 (7) | - | < 0.05 | 0.06 / 0.00 - 0.58 |
| *T. trichiura* + hookworm | 8 (2.5) | - | 0.06 | 0.18 / 0.01 - 1.41 |
| *A. lumbricoides* + *T. trichiura* + hookworm | 17 (5.4) | 1 (0.5) | < 0.05 | 0.08 / 0.00 - 0.58 |
| Any helminth poliparasitism | 83 (26) | 12 (5.6) | < 0.05 | 0.16 / 0.08 - 0.32 |
| Any helminth + *Entamoeba histolytica/dispar* | 70 (22) | 14 (6.5) | < 0.001 | 0.24 / 0.13 - 0.46 |

determinants, as evidenced by the sanitary conditions of the municipality's seat, which showed a very unfavorable situation. It was demonstrated, in the first survey, that soil-transmitted helminth infections were more frequent in the worst socioeconomic and sanitary backgrounds. Frequencies of these infections were significally higher on dwellings without latrines and on families whose parents had no income. The different education and literacy rate of the families did not result in significant variation of prevalence of intestinal helminth infections, although there was a trend of lower infections in more educated families.

Rural emigration and urbanization in Amazon represents, in a small scale, demographic tendencies observed on more populated Brazilian regions. At studied region, people originated from riverine communities, isolated in forest, have been migrated to the municipality seat, being installed under low conditions. Dwelling characteristics are very unfavorable. Houses are made with wood and sometimes have no floor. Environmental contamination with soil-transmitted helminths infective forms is high. In this scenario, children are on great risk for acquisition of high worm burdens.

As recommended by WHO, we concur that there are three main clear interventions for the control of enteric parasitic diseases: periodic anti-helminthic treatment, improvements of sanitation and health education. These can be analyzed in a hierarchical structure, with short, middle and long dated measures, all needing sustainability of actions and acting in an interdependent framework. The strategy of mass administration of anti-helminthics may be seen as a practicable short-dated measure with low costs, capable to reduce the burden attributed to soil-transmitted helminthiasis, and to educate the population about the importance of those infections and the need of deworming. Periodical deworming possibly could be more sustainable and effective if addressed to high risk groups and people with high parasitic burdens. The concept of 'worming-person', in this context, cames from the recognition that school-aged children are responsible for most of environmental contamination with infective forms. Deworming actions could be attached to immunization campaigns. Also, participation of school teachers for antihelmintic administration should be considered.

Safe water supply and improved sanitation are other focal points for intervention in this area.

Systems for collection and disposal of human wastes are considered politically and economically unproductive and costs of these facilities are often assumed by families. In this context, the pit-privy should represent an improvement on quality of excreta disposal[20]. It consists of a hand-doug pit over which is placed a squatting plate or slab, riser and seat. The pit-privy is a minimum-cost solution providing for defecation, excreta storage, digestion of waste solids and seepage of urine and moisture into the surrounding soil[20].

Cultural aspects may also influence improvement in practices of excreta disposal. The latrine program undertaken in Brazil during the early 1950s, which installed nearly two thousand latrines in rural villages of the Rio Doce valley is an example of such problem. Two years after its inauguration was discovered that few of the privies so installed were still in use and some had never been used[28].

This reality points to the crucial importance of the third and probably most important target on enteric transmitted diseases control: health education. In societies where community health education is poor, sanitation demands are low because of the lack of awareness on the people about relationships between poor hygiene and disease. Health education is intrinsically linked to general and regular education. Illiteracy rate reaches about 17% in Santa Isabel do Rio Negro and near half of population has four or less study years. If health education messages are included in the school curricula, universal access to school will contribute to improve the comprehension about importance of soil-transmitted helminthiasis prevention. In a scenario of low access to school and high illiteracy rate, alternative health education programs should be implemented. In this context, education material should largely consists of posters with drawings and less of written messages. Public Health personnel working as health agents should be trained to educate people about hygiene and enteric parasitic diseases prevention.

This trial contributed to estimate the prevalence of enteric parasitic infections and the sanitary conditions in an urban area in Brazilian Amazon, and showed the role of a mass drug administration campaign as a practicable short-dated measure against soil-transmitted helminthiasis. Also, the study showed the need of improvement on sanitation and safe water supply in the locality. Additionally, a project of health education should be carried out by health and education personnel. Further studies with large samples, including riverine communities and assessing intensity of infections are needed to better evaluate the impact of such interventions.

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## RESUMO

### Tratamento em massa para controle das helmintíases intestinais em área endêmica na Amazônia Brasileira

O presente trabalho objetivou avaliar a prevalência e o papel de um tratamento em massa das helmintíases intestinais em Santa Isabel do Rio Negro, Estado do Amazonas, Brasil. Foi realizado em 2002 um estudo seccional, incluindo inquérito copro-parasitológico, objetivando a obtenção das prevalências das parasitoses intestinais e dados sobre as condições sanitárias do local, estudando-se uma amostra de 308 indivíduos. Em 2003 foi realizada intervenção para tratamento em massa das helmintíases intestinais com administração de albendazol (ou mebendazol para crianças entre 12 e 24 meses) na sede do município, alcançando-se 83% de cobertura. Novo inquérito copro-parasitológico foi realizado em 2004, para comparação das prevalências antes a após o tratamento. As prevalências das infecções por *Ascaris lumbricoides, Trichuris trichiura* e ancilostomídeos foram 48%, 27% e 21%, respectivamente em 2002. Em 2004 observou-se redução significativa das infecções por *Ascaris lumbricoides* ($p < 0,05$; OR / 95% IC = 0,44 / 0,30 - 0,65), *Trichuris trichiura* ($p < 0,05$; OR / 95% IC = 0,37 / 0,22 - 0,62), ancilostomídeos ($p < 0,05$; OR / 95% IC = 0,03 / 0,01 - 0,15) e poliparasitismo por helmintos intestinais ($p < 0,05$; OR / 95% IC = 0,16 / 0,08 - 0,32). Foi também observada redução da prevalência de infecção por *Entamoeba histolytica/dispar* ($p < 0,05$; OR / 95% CI = 0,30 / 0,19 - 0,49). Concluiu-se que o tratamento em massa pode auxiliar o controle das helmintíases intestinais, porém ações governamentais em infraestrutura urbana e educação são essenciais para uma redução sustentada das prevalências destas infecções.

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